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ARKANSAS TIMBER STANDS BEFORE AND AFTER CUTTING

by
Herbert S. Sternitzke and Lee M. James

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A REPORT OF THE SOUTHERN FOREST SURVEY
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SOUTHERN FOREST EXPERIMENT STATION
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FOREST SERVICE, U.S. DEPT. OF AGRICULTURE

THE SOUTHERN FOREST SURVEY

The Southern Forest Survey, an activity of the Southern Forest Experiment Station, covers the seven States of the Station's territory--Alabama, Arkansas, Louisiana, Mississippi, Oklahoma, Tennessee, and Texas. This Survey is a part of the nation-wide Forest Survey authorized by the McSweeney-McNary Forest Research Act of 1928. Its fivefold purpose is (1) to take inventory of the supply of standing timber and other forest products; (2) to ascertain the rate at which this supply is being increased through growth; (3) to determine the rate at which this supply is being diminished through industrial and local use, and by fire, insects, disease, and other agencies; (4) to estimate the present requirements and the probable future trend in the requirements for timber and other forest products; and (5) to correlate these findings with existing and anticipated economic conditions, in order that policies may be formulated for the effective use of lands suitable for forest production.

Figure I.— Forest Survey regions in Arkansas.

ARKANSAS TIMBER STANDS BEFORE AND AFTER CUTTING

Herbert S. Sternitzke and Lee M. James[1/]
Southern Forest Experiment Station

To learn about cutting practices in Arkansas timber stands--the kind of stands selected for logging, the kind of trees cut, and the effect of cutting on the character of the forest--a survey of logging operations in the State was conducted in 1949-50.

On the average both pulpwood and sawlog operators take two-thirds of the pine growing stock.[2/] Pine trees cut for sawlogs in southwest Arkansas average bigger than in the mountain regions, but stands are cut more heavily in the mountains. Large sawmill operators leave a heavier residual stand and take more of their cut from big trees than do the small mill operators.

Hardwood logging does not cut into stand volume as heavily as pine: volume removed ranges from one-fifth of the growing stock for hewn ties to half for veneer and sawlogs. Higher grade hardwood timber is cut more severely than lower grades. Hardwood timber cut in southwest Arkansas and the Delta is usually bigger than in the mountain regions, although the proportion of stand left after cutting is about the same in all regions. The contrast is less than in pine, but large hardwood sawmill operations also take bigger trees than small mill operations and leave more of the initial stand after logging.

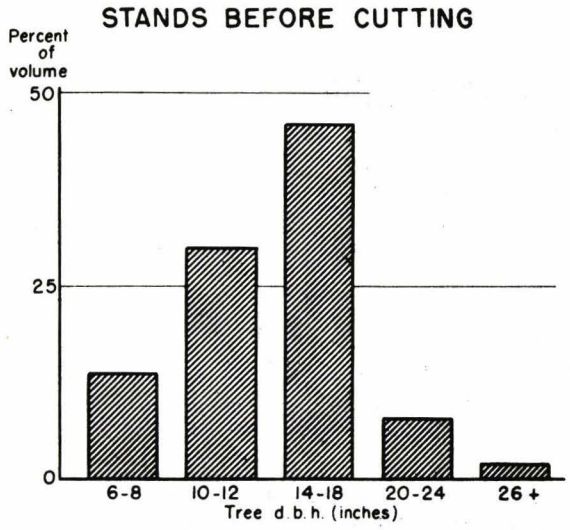
Details of the findings are given in the charts on the following pages. A description of the field survey, an estimate of the sampling errors, and definitions of terms are on pages 13-15.

1/ Field data used in this report were collected by the authors and the following Southern Forest Survey personnel: J. L. Burkle, M.I. Hubbard, W. A. Johnson, Beryl O. Jones, and A. L. Tofte.

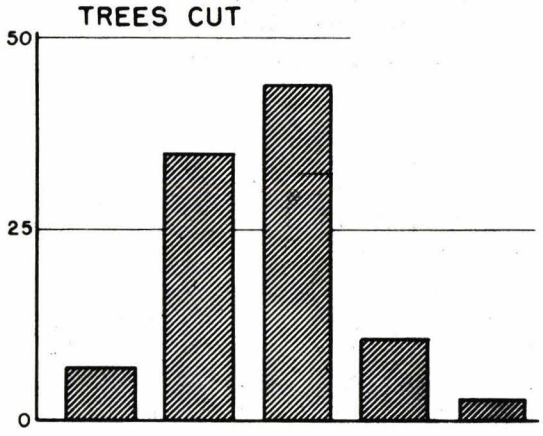
2/ Only growing stock is considered in this report. Except where sawlog growing stock is specified, the reference is to total cubic-foot growing stock.

SAWLOG CUTTING IN PINE STANDS

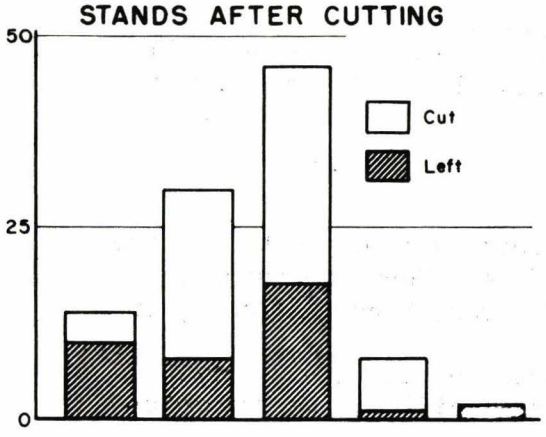
(Cubic-foot growing stock, by tree diameter)



Stands selected for logging generally run to bigger trees than are found in the average pine stand.



Despite the preference for large timber, small trees are usually merchantable for sawlogs. Four-tenths of the cut is in 6- to 12-inch trees.



A third of the growing stock is left standing.

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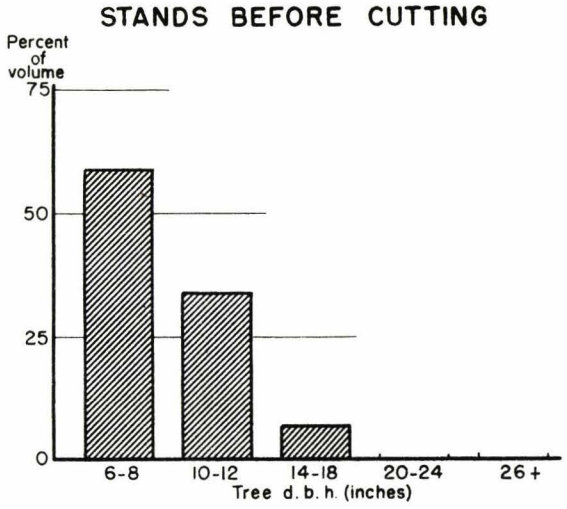
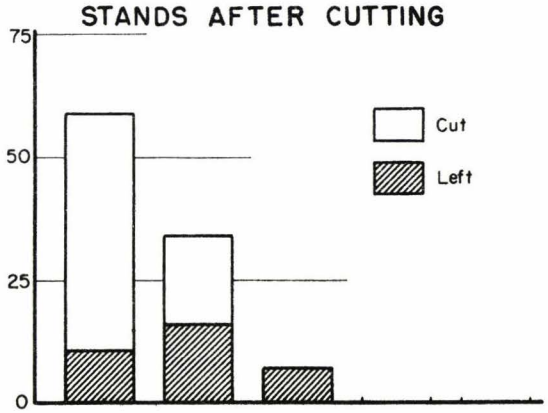
PULPWOOD CUTTING IN PINE STANDS

(Cubic-foot growing stock, by tree diameter)



Most pulpwood is cut in stands of small timber.

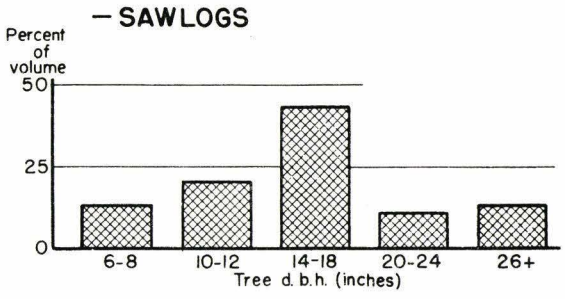
Logging and manufacturing considerations plus the usual earmarking of larger trees for sawlog cutting limit the size of trees cut for pulpwood.

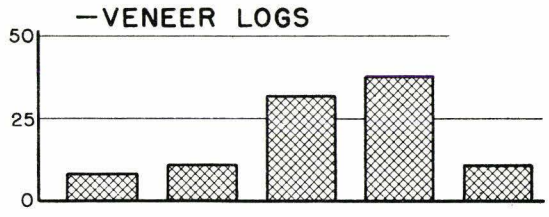


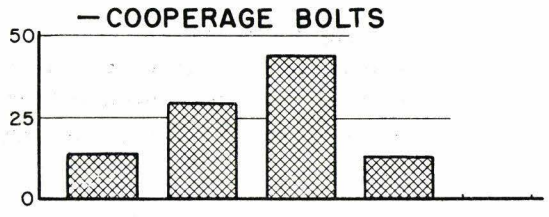
As in sawlog operations, a third of the total growing stock is left standing.

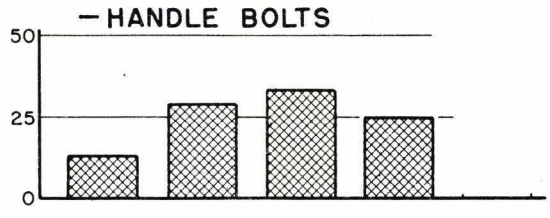
HARDWOOD STANDS BEFORE CUTTING FOR—

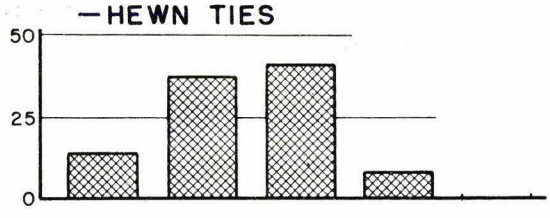
(Cubic-foot growing stock, by tree diameter)











In most of the hardwood stands selected for cutting, roughly one-third to four-tenths of the growing stock is in trees 14 to 18 inches d.b.h. A fourth or less of the volume is in trees above 18 inches d.b.h. except in veneer operations, where generally half the volume is in 20-inch or larger trees.

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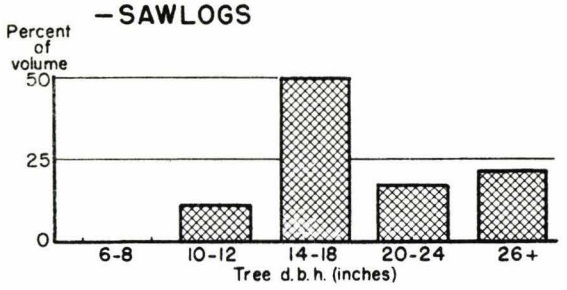
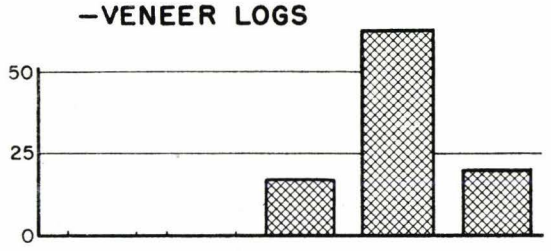
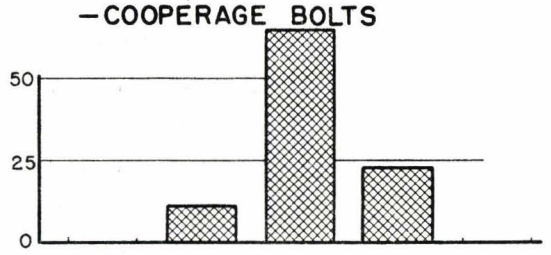
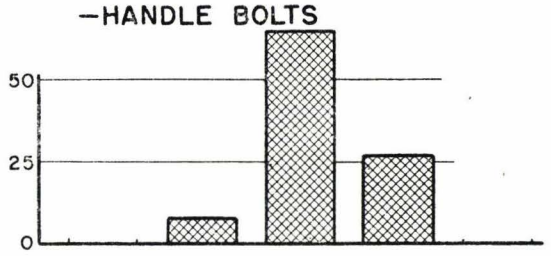
HARDWOOD TREES CUT FOR —

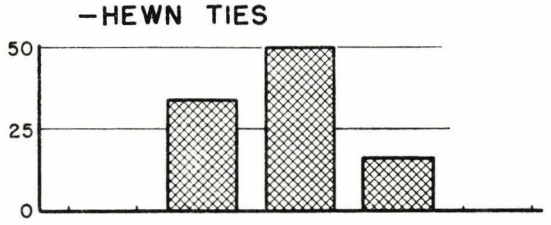
(Cubic-foot growing stock, by tree diameter)







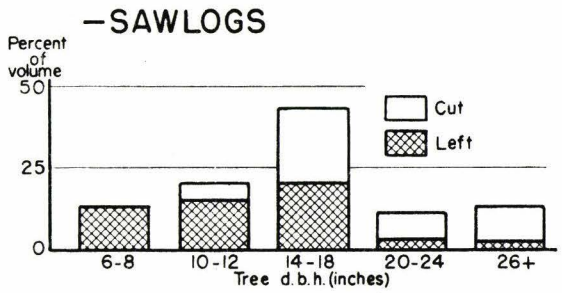


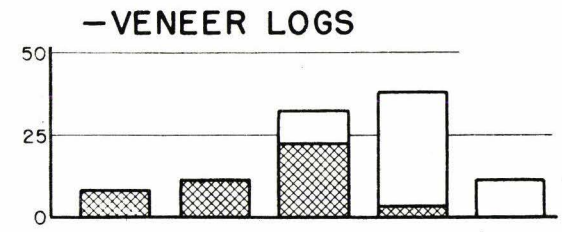


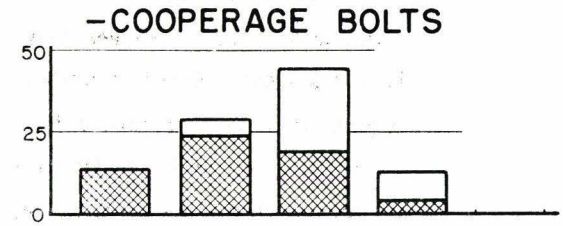
Over 80 percent of the hardwood volume cut for veneer logs is in big trees (20 inches d.b.h. or larger). In sawlog operations four-tenths of the cut is in big trees. For other products — cooperage, handle stock, hewn ties — smaller trees are cut.

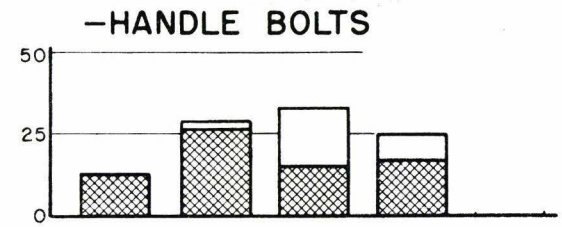
HARDWOOD STANDS AFTER CUTTING FOR—

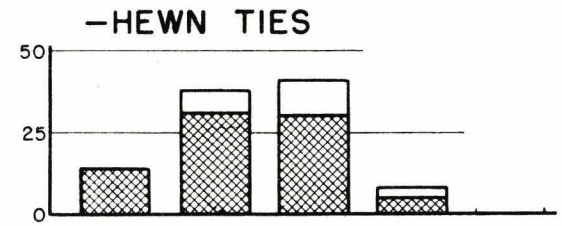
(Cubic-foot growing stock by tree diameter, and proportion cut and left)







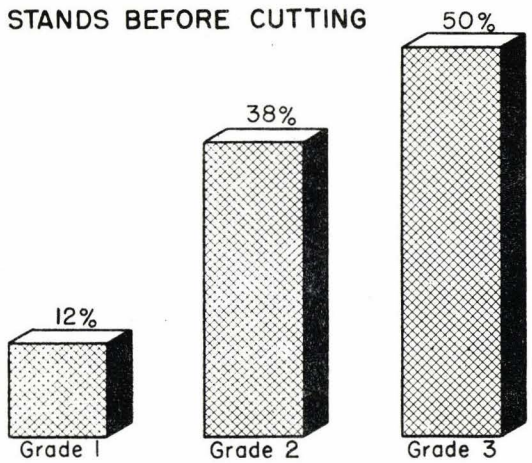


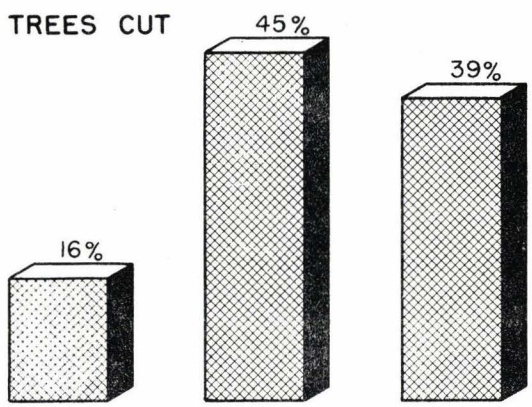


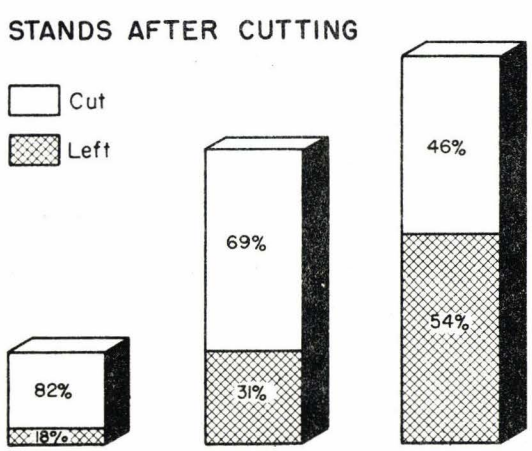
Logging for all hardwood products leaves a larger portion of the stand than does pine logging for either sawlogs or pulpwood: the portion left in hardwood ranges from half the growing stock for veneer and sawlogs to 8/10ths for hewn ties. Lighter hardwood cutting usually reflects specialized size, species, and quality requirements.

TREE QUALITY IN HARDWOOD STANDS CUT FOR SAWLOGS

(Sawlog growing stock, by tree grade)







Before the average sawlog operation, half the timber in the stand is of the lowest merchantable grade (grade 3); after logging, two-thirds of the timber left standing is grade 3. Such high-grading for the better quality trees leads to stand deterioration.

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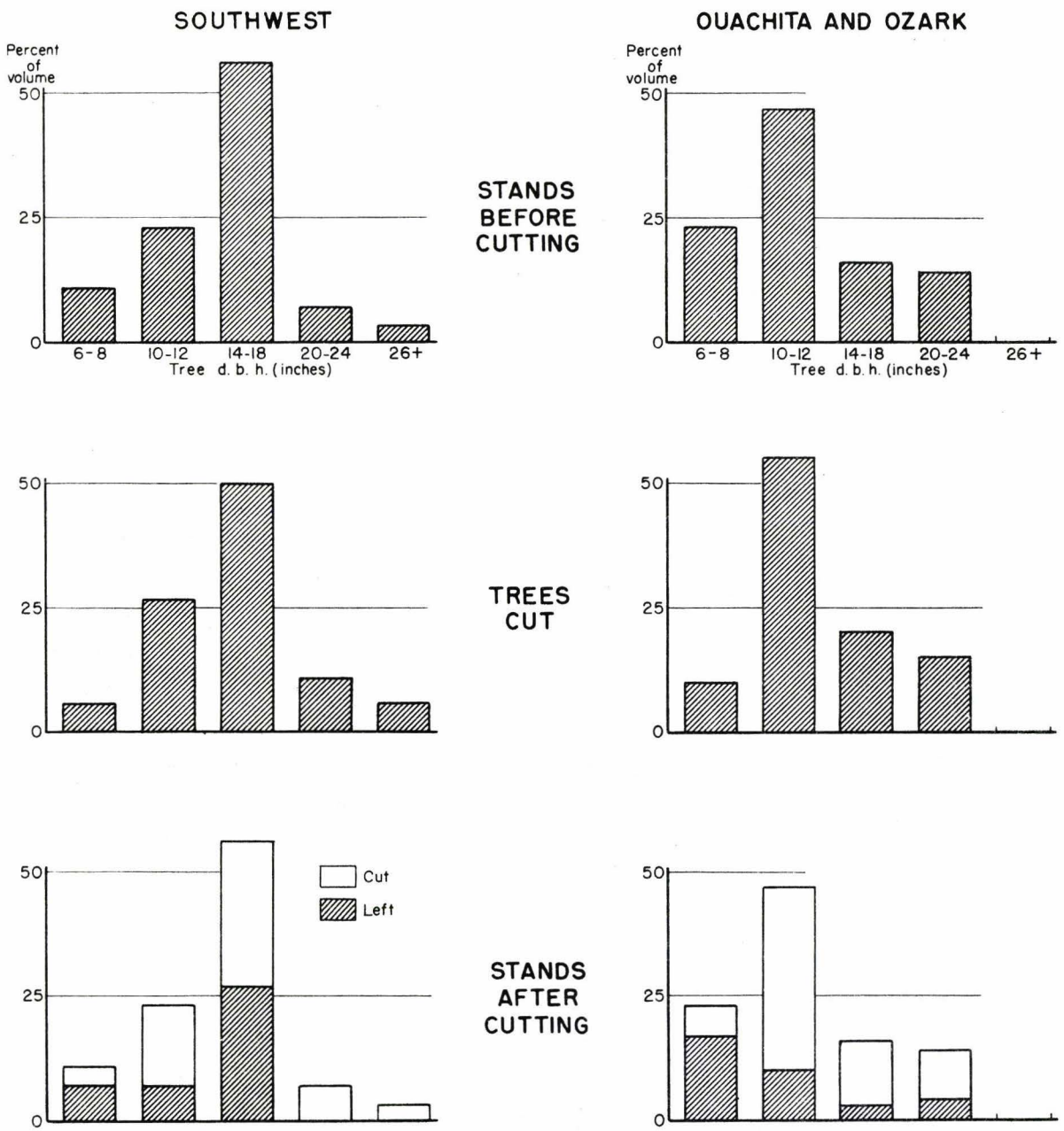
SAWLOG CUTTING IN PINE STANDS BY REGION

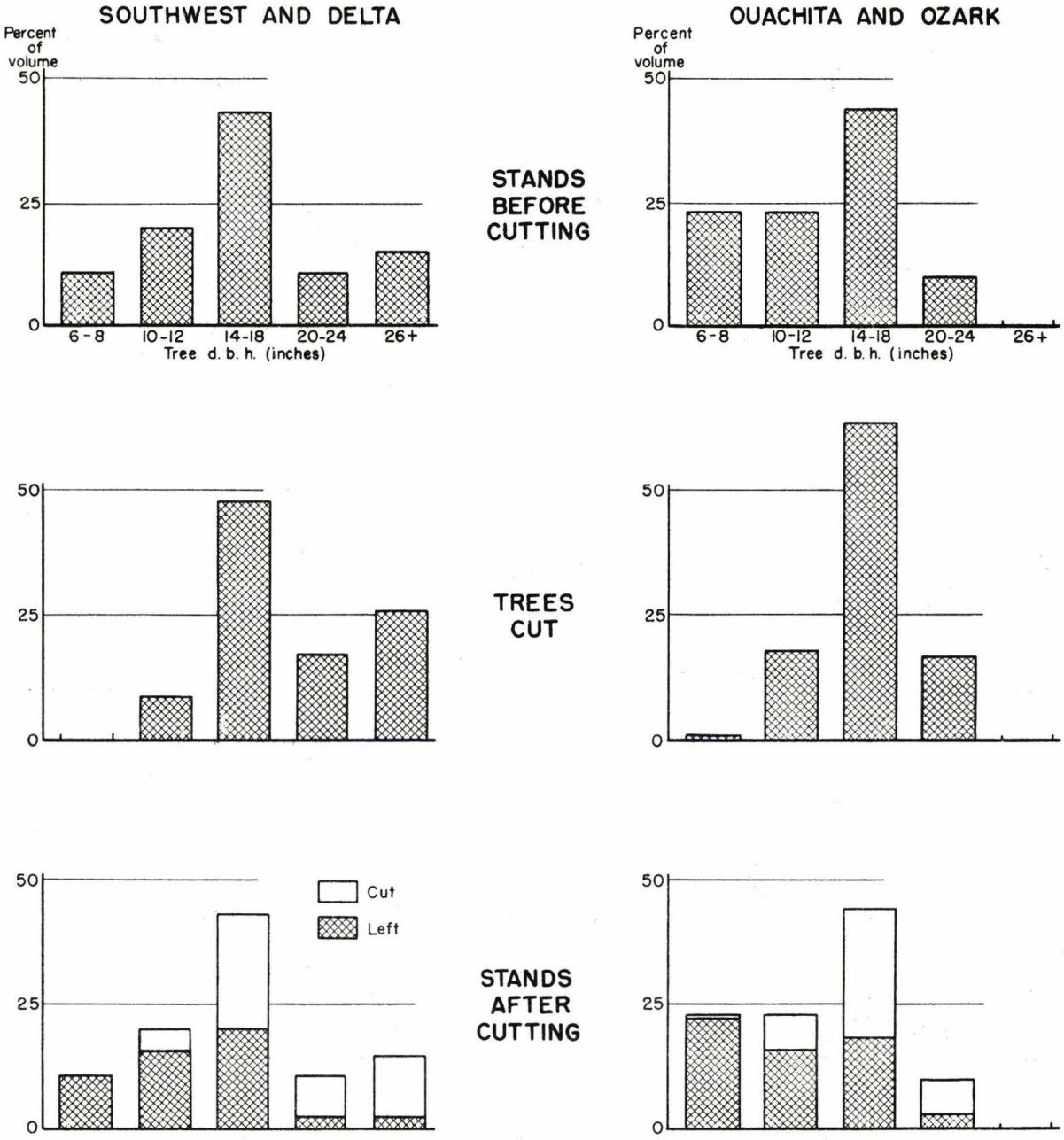
(Cubic-foot growing stock, by tree diameter)



Although some large tracts of old-growth shortleaf pine remain in the Ouachita Mountains, pine stands selected for cutting in southwest Arkansas average substantially larger timber than in the mountains. Roughly two-thirds of the volume cut in the southwest region is in trees above 12 inches d. b. h., twice as much as in the mountain regions, but cutting tends to take a bigger portion of the stand volume in the mountains.

SAWLOG CUTTING IN HARDWOOD STANDS, BY REGION

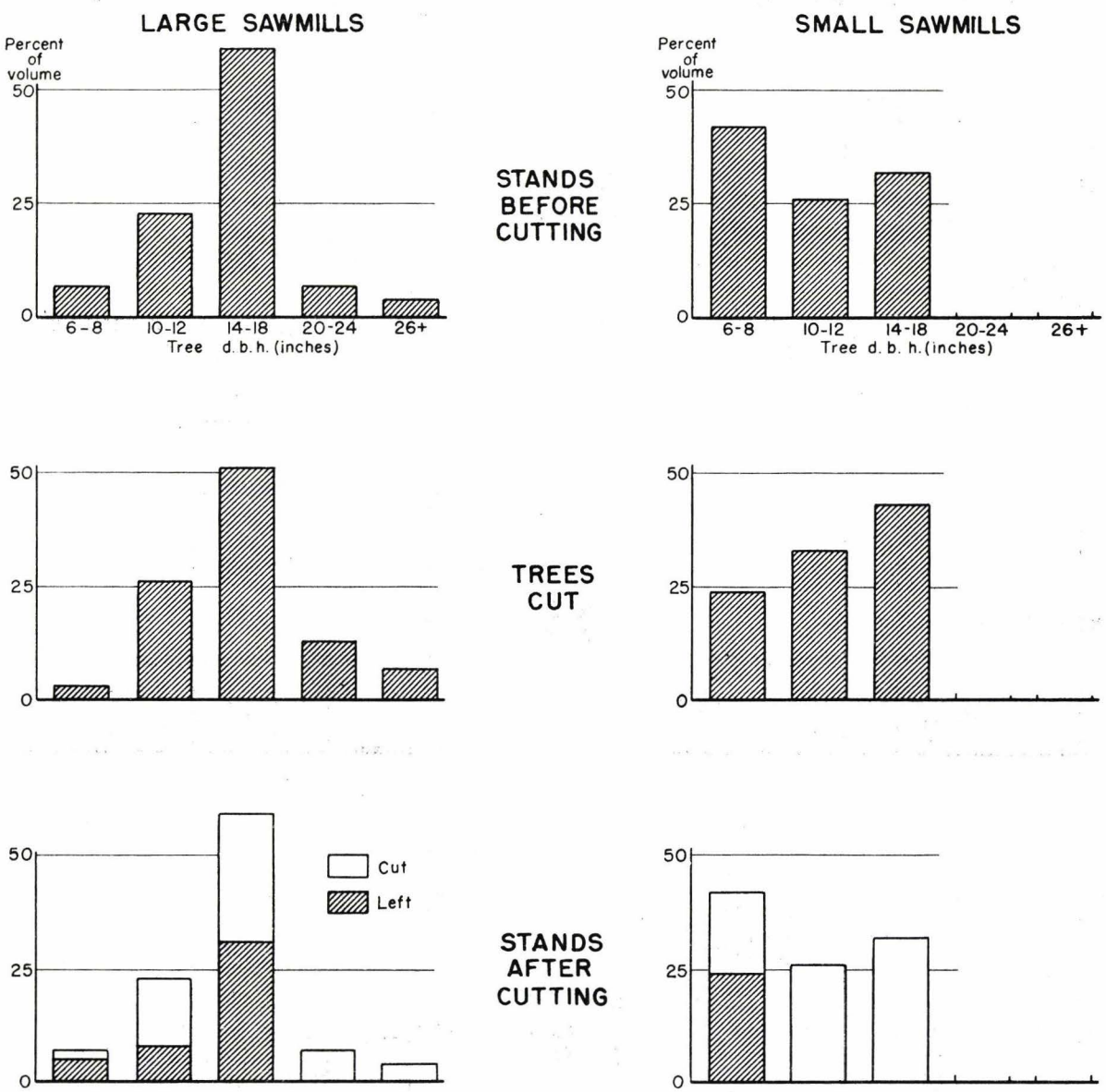
(Cubic-foot growing stock, by tree diameter)



In the southwest and Delta regions, hardwood stands in which cutting is done average somewhat bigger timber than on the generally poorer sites of the Ouachita and Ozark Mountains. Although trees cut also have a larger average size in the southwest and Delta regions, the proportion of stand left after logging is about the same in all regions.

SAWLOG CUTTING IN SOUTHWEST ARKANSAS PINE STANDS, BY MILL SIZE

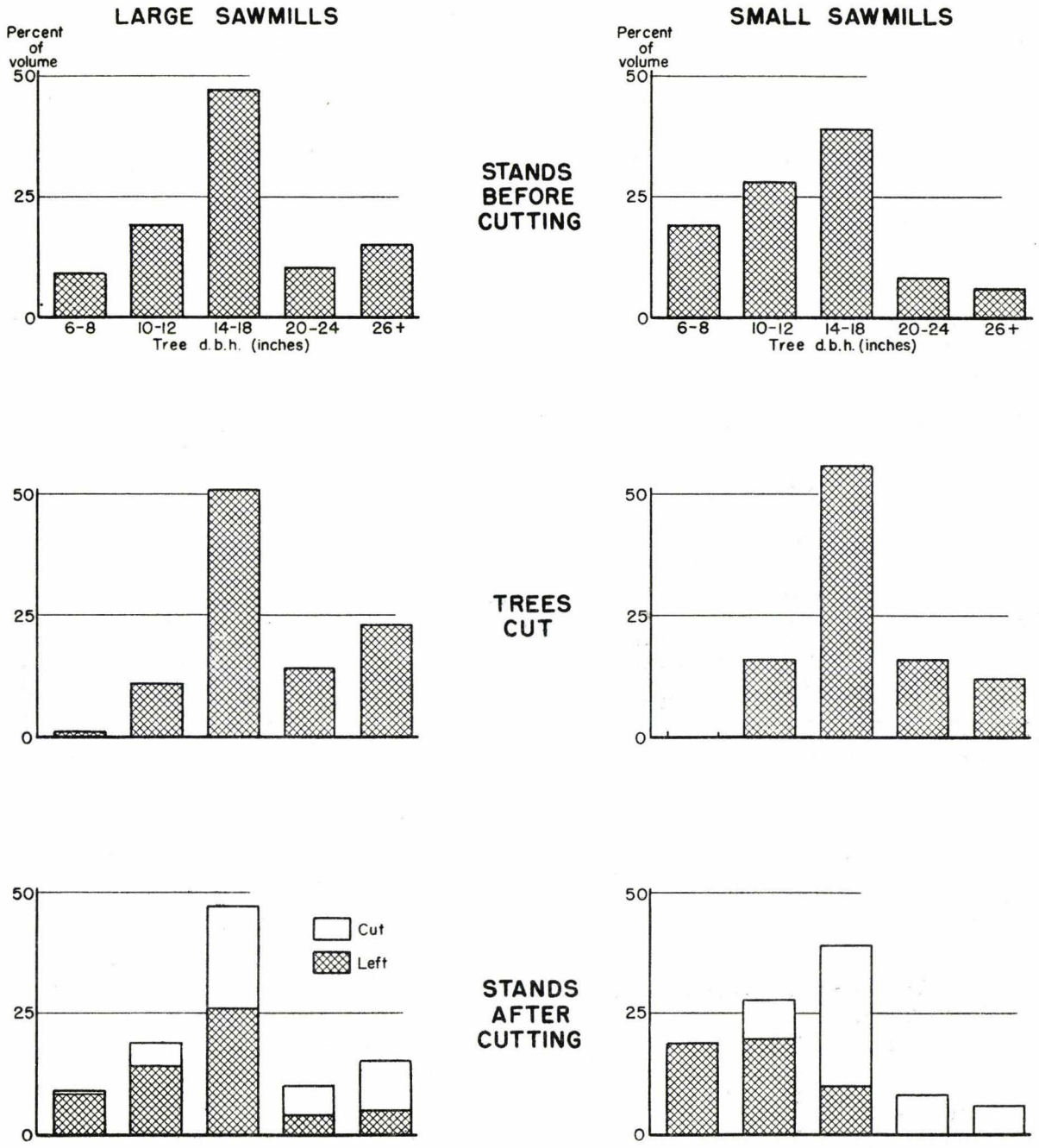
(Cubic-foot growing stock, by tree diameter)



Logging operations for large sawmills are carried out in stands with an average of more than twice as much pine volume in trees over 12 inches d.b.h. as the small mills have access to. This is traceable to several causes: large mills can often afford to bid more for the bigger trees; some of the companies operating large mills own extensive tracts of well-managed timber; and the zero-margin tree diameter limit is usually higher for the large mills. About half the timber in trees under 20 inches is left standing in large-mill operations. Only a fourth is left in small-mill operations, virtually all of it in 6-and 8-inch trees.

SAWLOG CUTTING IN SOUTHWEST ARKANSAS HARDWOOD STANDS, BY MILL SIZE

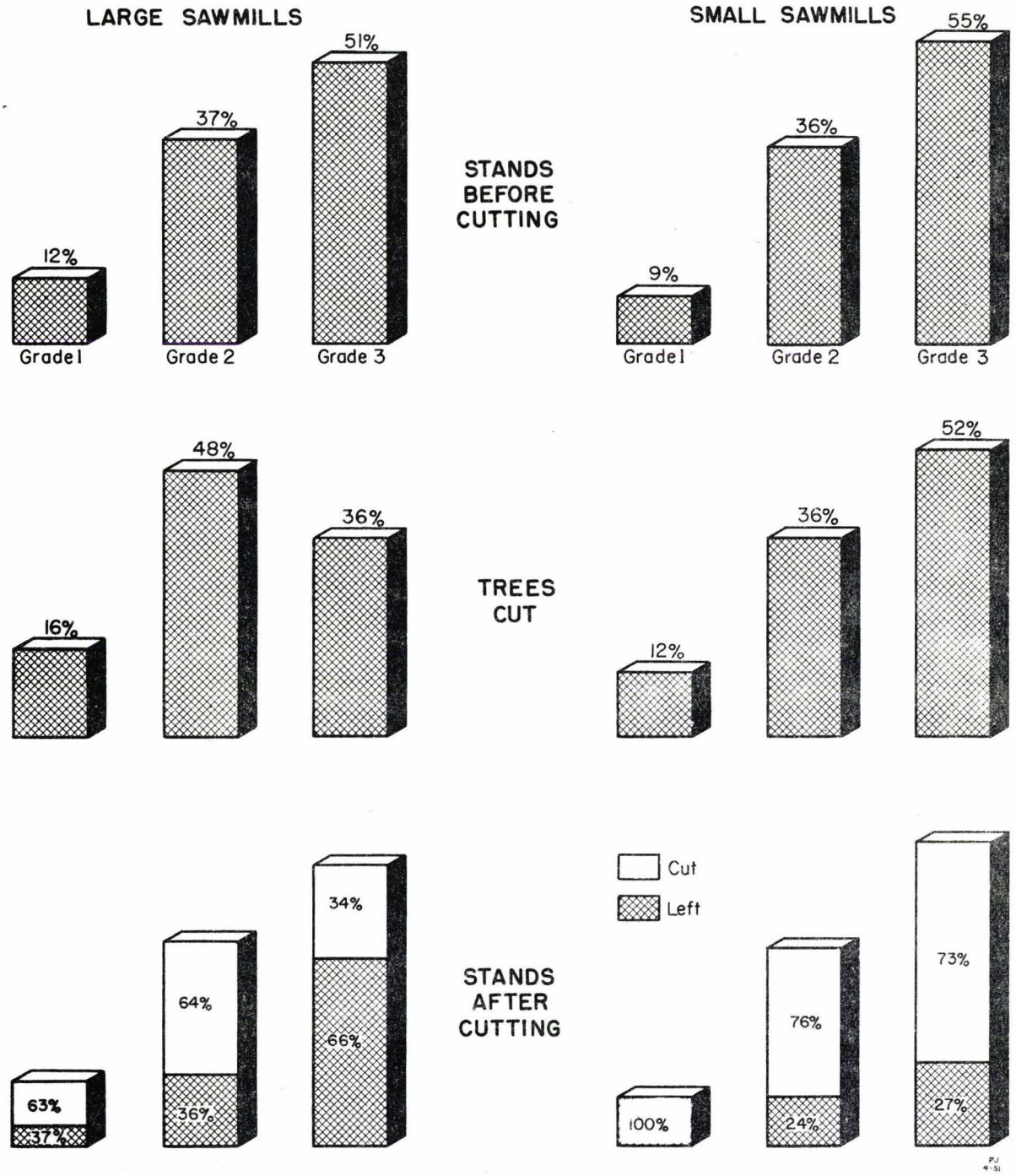
(Cubic-foot growing stock, by tree diameter)



Large hardwood mills have access to stands of bigger average tree size than do small mills, though the contrast is less than in pine. A bigger portion of the initial stand volume is left after logging for large mills, although more of the cut comes from big trees.

SAWLOG CUTTING IN SOUTHWEST ARKANSAS HARDWOOD STANDS, BY MILL SIZE

(Sawlog growing stock, by tree grade)



Hardwood stands entered in large- and small-mill operations have about the same quality timber initially, but small-mill cutting is much more severe in all grades.

The Field Survey and Its Accuracy

This report is based on measurements of 88 quarter-acre sample plots taken in 1949-50 on logging operations throughout Arkansas. The plots were selected by products roughly in proportion to 1948 drain. Fence posts, fuel wood, poles, piling, and miscellaneous products were omitted from the study. Their omission permitted stronger sampling of other products.

Product	Timber drain, (preliminary estimate) 1948
	Percent
Lumber	57
Pulpwood	10
Fuel wood	22
Fence posts	2
Cooperage	2
Veneer	2
Hewn ties	1
Handle bolts	1
Poles and piling	1
Miscellaneous	2
Total	100

The location of sample plots was controlled to insure geographic coverage of each product in proportion to drain, but within each locality plots were chosen at random. All products were sampled separately--i.e., cutting on any given plot was for one timber product only. In addition, cutting on each plot was usually either of pine or of hardwood species.

Sampling proved to be adequate for the statistical compilations presented. Standard errors of estimate for statistics in a typical chart are as follows:

Diameter breast high (inches)	Estimate of hardwood volume cut for small sawmills in southwest Arkansas	Standard error of estimate
	Percent	
10 - 12	16	± 10
14 - 18	56	± 10
20 - 24	16	± 8
26 and up	12	± 6

Following are the highest standard errors for any chart in the report:

Diameter breast high (inches)	Estimate of pine volume cut for small sawmills in southwest Arkansas	Standard error of estimate
	Percent	
6 - 8	24	± 11
10 - 12	33	± 11
14 - 18	43	± 18

Definition of Terms

Class of Timber

Growing stock. Sawlog growing stock is the sawlog portion of sawlog trees. Total growing stock includes sawlog growing stock, upper stems of pine sawlog trees, and entire stems of cordwood trees to a minimum diameter of 4 inches inside bark.

Sawlog tree. A live, merchantable pine 9.0 inches or larger in d.b.h., or a live, merchantable hardwood 11.0 inches or larger in d.b.h. To be merchantable, the tree must have at least a merchantable 12-foot butt log or 50 percent of its gross volume in merchantable logs.

Cordwood tree. A live tree 5.0 inches or larger in d.b.h., but smaller than sawlog size, which would become a sawlog tree if it should grow to sawlog size.

Volume

Board-foot (sawlog) volume. Net volume in merchantable sawlogs in sawlog trees, measured in board feet by the International 1/4-inch log rule (sawlog growing stock).

Cubic-foot volume. Net volume of total growing stock, measured in cubic feet (cubic-foot growing stock).

Diameter

D.b.h. (diameter breast high). Tree diameter in inches, outside bark, measured at 4½ feet above ground.

Diameter class. Each 2-inch diameter class includes diameters 1.0 inch below and 0.9 inch above the stated midpoint. E.g., the 12-inch class includes trees 11.0 inches through 12.9 inches.

Size of Sawmill

Large sawmill. A sawmill producing at least 3 million board feet of lumber annually.

Small sawmill. A sawmill producing less than 3 million board feet of lumber annually.

Hardwood Tree Grade[3/]

(Tree grade is same as grade of butt log)

Grade 1.--Logs having five-sixths or more of their length on the 3 best faces in clear-cuttings not less than 3 feet long; they yield at least 65 percent of their volume in No. 1 Common and better grades of lumber.

Grade 2.--Logs having two-thirds to five-sixths of their entire length on the 3 best faces in clear-cuttings not less than 3 feet long; they yield at least 40 percent of their volume in No. 1 Common and better grades of lumber.

Grade 3.--

--A. Logs below grade 2, having 1/2 or more of their entire length on the 3 best faces in clear-cuttings not less than 2 feet long; they yield at least 13 percent of their volume in No. 1 Common and better grades of lumber.

--B. Logs which do not meet the clear-cutting requirements of 3A or higher grades, but which are sound, reasonably straight, and without large knots or knot clusters; they are suitable for ties or low-grade structural timbers.

3/ For detailed external specifications of log grades used, see Forest Service Committee on Interim Hardwood Sawlog Grades, "Interim Sawlog Grades for Southern Hardwoods." Southern Forest Experiment Station, 9pp. (processed.) 1948, rev.

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